antisense RNA strand having a region that is substantially complementary to at least part of an mRNA transcript of the VP35 gene. In another embodiment, the subject does not experience a decrease in one or both of lymphocyte or platelet count after administration of the dsRNA. In other embodiments, the subject does not experience an increase in cytokine levels (e.g., IFN-alpha or TNF-alpha levels).

[0029] In another aspect, the invention features a method of sustaining lymphocyte or platelet count in a mammal (e.g., a human or nonhuman primate) infected with an Ebola virus. The method includes administering a dsRNA to the subject, where the dsRNA includes an antisense RNA strand having a region which is less than 30 nucleotides in length, generally 19-24 nucleotides in length, and is substantially complementary to at least part of an mRNA transcript of a gene from the Ebola virus. In one embodiment, the dsRNA includes an antisense RNA strand having a region that is substantially complementary to at least part of an mRNA transcript of the VP35 gene. In other embodiments, the subject does not experience an increase in cytokine levels (e.g., IFN-alpha or TNF-alpha levels).

BRIEF DESCRIPTION OF THE FIGURES

[0030] FIG. **1** is a graph showing that siRNAs formulated with lipidoid LNP01 protected mice from a lethal Ebola virus challenge.

[0031] FIG. **2** is a graph showing that a single injection of a liposomally formulated siRNA delivered by ip or iv protected mice from a lethal Ebola challenge. VP35 siRNA was AD-11570

[0032] FIG. **3** is the structure of NP98 lipid.

[0033] FIG. **4** is a graph showing that siRNAs formulated with DODMA protected mice from a lethal Ebola virus challenge.

[0034] FIG. **5** is a graph showing that siRNAs formulated with DODMA were effective down to 0.04 mg/kg to protect mice injected with Ebola.

[0035] FIG. **6** is a graph showing that siRNAs formulated with DODMA were effective to protect guinea pigs from a lethal Ebola virus challenge.

[0036] FIG. **7** is a graph showing the efficacy of siRNAs against different Ebola genes formulated with DODMA in a guinea pig model of Ebola.

[0037] FIG. **8** is a graph presenting the observed decrease in viral titers in the serum of mice following administration of LNP01-formulated VP35 siRNA.

DETAILED DESCRIPTION OF THE INVENTION

[0038] The invention provides double-stranded ribonucleic acid (dsRNA), as well as compositions and methods for inhibiting the expression of a gene from the Ebola virus in a cell or mammal using the dsRNA. The invention also provides compositions and methods for treating pathological conditions and diseases in a mammal caused by Ebola infection using dsRNA. dsRNA directs the sequence-specific degradation of mRNA through a process known as RNA interference (RNAi).

[0039] The dsRNA of the invention comprises an RNA strand (the antisense strand) having a region which is less than 30 nucleotides in length, generally 19-24 nucleotides in length, and is substantially complementary to at least part of an mRNA transcript of a gene from the Ebola virus. The use of these dsRNAs enables the targeted degradation of mRNAs of genes that are implicated in replication and or maintenance of Ebola infection and the occurrence of systemic hemorrhage and multi-organ failure in a subject infected with the Ebola virus. Using cell-based and animal assays, the present inventors have demonstrated that very low dosages of these dsRNA can specifically and efficiently mediate RNAi, resulting in significant inhibition of expression of a gene from the Ebola virus. Thus, the methods and compositions of the invention comprising these dsRNAs are useful for treating pathological processes mediated by Ebolaviral infection by targeting a gene involved in Ebola relication and/or maintenance in a cell.

[0040] The following detailed description discloses how to make and use the dsRNA and compositions containing dsRNA to inhibit the expression of a gene from the Ebola virus, as well as compositions and methods for treating diseases and disorders caused by the infection with the Ebola virus, such as systemic hemorrhage and multi-organ failure. The pharmaceutical compositions of the invention comprise a dsRNA having an antisense strand comprising a region of complementarity which is less than 30 nucleotides in length, generally 19-24 nucleotides in length, and is substantially complementary to at least part of an RNA transcript of a gene from the Ebola virus, together with a pharmaceutically acceptable carrier.

[0041] Accordingly, certain aspects of the invention provide pharmaceutical compositions comprising the dsRNA of the invention together with a pharmaceutically acceptable carrier, methods of using the compositions to inhibit expression of a gene in a gene from the Ebola virus, and methods of using the pharmaceutical compositions to treat diseases caused by infection with the Ebola virus.

I. DEFINITIONS

[0042] For convenience, the meaning of certain terms and phrases used in the specification, examples, and appended claims, are provided below. If there is an apparent discrepancy between the usage of a term in other parts of this specification and its definition provided in this section, the definition in this section shall prevail.

[0043] "G," "C," "A" and "U" each generally stand for a nucleotide that contains guanine, cytosine, adenine, and uracil as a base, respectively. However, it will be understood that the term "ribonucleotide" or "nucleotide" can also refer to a modified nucleotide, as further detailed below, or a surrogate replacement moiety. The skilled person is well aware that guanine, cytosine, adenine, and uracil may be replaced by other moieties without substantially altering the base pairing properties of an oligonucleotide comprising a nucleotide bearing such replacement moiety. For example, without limitation, a nucleotide comprising inosine as its base may base pair with nucleotides containing adenine, cytosine, or uracil. Hence, nucleotides containing uracil, guanine, or adenine may be replaced in the nucleotide sequences of the invention by a nucleotide containing, for example, inosine. Sequences comprising such replacement moieties are embodiments of the invention.

[0044] As used herein, "Ebola viruses", are members of the family Filoviridae, are associated with outbreaks of highly lethal hemorrhagic fever in humans and nonhuman primates. Human pathogens include Ebola Zaire, Ebola Sudan, and Ebola Ivory Coast. Ebola Reston is a monkey pathogen and is not considered a significant human pathogen. The natural reservoir of the virus is unknown and there are currently no